

**REMARKS**

Claims 1, 3-21 and 23-25, stand in the present application, claims 1, 14, 21, 24 and 25 having been amended. Reconsideration and favorable action is respectfully requested in view of the above amendments and the following remarks.

In the Office Action, the Examiner has rejected claims 1-13 and 21 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention. More particularly, the Examiner has noted that certain terms within the claims are italicized in some places and not in others. As noted above, Applicant has amended independent claims 1 and 21 in order to correct the deficiency pointed out by the Examiner. Accordingly, the Examiner's § 112, second paragraph, rejection of the claims is believed to have been overcome.

The Examiner has also rejected claims 1, 3-21 and 23-25 under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter.

The rejection of claims 1, 3-21 and 23-25 under 35 U.S.C. § 101 for allegedly being directed to non-statutory subject matter is respectfully traversed.

Claims are to be reasonably interpreted through the eyes/mind of a hypothetical person skilled in the art and in light of the accompanying specification. In that regard, applicant's claims have always been "tied" to "apparatus" – as well as involving the "transformation" of an article or material to a different state or thing. To further emphasize that such is the case, the claims have been amended above so as to explicitly be directed to an "automated" method or system using at least one computer to

execute a computer program for optimizing the allocation of tasks to available resources.

Clearly, anyone of skill in the relevant art would understand that the Applicant's claimed methods are executed by a particular apparatus (e.g., a computer or suite of computers specially configured by programming so as to perform the stated operations). Furthermore, those having skill in the relevant art will understand that any and all computers are "state machines" wherein the various circuits and/or magnetic storage media or the like take on different unique and identifiable states at each successive clock cycle of the computer apparatus. That is, the physical solid-state or other circuitry and/or data storage media necessarily involve transformation of physical things, articles and/or materials from one state to a different state or thing in order to do anything useful. That is, those skilled in the art will understand that it would be impossible to perform the stated operations unless one used as a suitably configured computer apparatus to transform the state of numerous registers, memory circuits, memory sites, buffers, CPUs and the like throughout the execution of the specially configured computer program structure.

In any event, the above amendments explicitly "tie" the recited method steps or structures to a "machine" and thus constitute statutory subject matter for at least this reason.

The Examiner has rejected claims 1-6, 8-21 and 23-25 under 35 U.S.C. § 102(b) as being anticipated by Corne et al. ("Corne"). Applicant respectfully traverses the Examiner's § 102(b) rejection of the claims.

The Corne reference has been misapplied against independent claims 1, 14, 21 and 23-25 in that Corne discloses solving a different problem in a different way, as compared to the present claims. Indeed, at page 7 of the Office Action, the Examiner mistakenly asserts that in Corne "[t]he nodes in the network are resources." To the contrary, in Corne it is the links between the nodes which are the critical resources for the problem addressed, since each of the three objectives which Corne is seeking to optimize concerns the links rather than the nodes.

The offline routing problem to be solved by embodiments of the present invention can be expressed as follows: to route multiple traffic requests  $r$  such that:

- a) no link is over-capacitated,
- b) communications costs associated with use of a link are minimised, and
- c) link utilizations are all below a specified, fixed target utilisation,

and therefore addresses 3 objectives of the offline routing problem.

The bandwidth capacities of links in the network are of two types: a backbone type, having a capacity of 64 units (nodes 1 and 4 in Figure 2), and a local type having a capacity of 16 units (nodes 2, 3, 5-8).

See Corne at page 12, line 26 to page 13, line 1 (emphasis supplied). Thus, the stated objectives of Corne, i.e., objectives a) b) and c) identified above, all concern links.

Furthermore, Figure 2 of Corne illustrates the network whose routing is to be optimized as having 11 links (7 nodes) and further illustrates link costs 1-4. It is noteworthy that Corne defines its fitness vector as having three elements, and that each element of the fitness vector is an equation – namely, equations 1, 2 and 3 set out on pages 13 and 14 of Corne – which can be evaluated for any given possible solution to

arrive at three numbers which then form the elements for any given individual fitness vector for a given "solution."

The three objective functions defined above thus provide individual components  $f_1(x)$ ,  $f_2(x)$ ,  $f_3(x)$  (in this case 3 because we have 3 objectives) . . .

See Corne at page 14, lines 20-22 (emphasis supplied). Moreover, the equations are generally summations in respect of all of the links in the network so as to arrive at functions which are indicative of the global situation, rather than being indicative only of a local solution pertaining only to a single resource.

With respect to the rejected claims, the Examiner alleges that the claim term "groups" is not further defined in the claims and so that it is reasonable for the Examiner to read the "objectives" of Corne as equivalent to the groups required in the present claims. See Office Action at page 7. Appellant disagrees with the Examiner's assertion. In fact, there are many limitations on the term "groups" throughout each of the present claims which make it improper for the Examiner to interpret the objectives of Corne as being in any way equivalent to the groups disclosed and claimed in the present application. Tellingly, the Examiner's cited portions of Corne do not make any mention of the term "groups." See Office Action at page 7 citing Corne at page 2, lines 4-6; page 3, line 30 to page 4, line 13; page 8, lines 26-32; page 9, lines 16-21, 23-30; page 12, line 26 to page 15, line 19; page 16, lines 5-23; page 24, line 12 to page 25, line 11; page 28, lines 14-19; and Figs. 3 and 4.

First, the term "groups" is defined (and therefore limited) in multiple elements including the preamble of the relevant claims. For example, the amended preamble of claim 1 specifies a "method for optimizing the allocation of a set  $W$  of  $n$  tasks to  $m$  available resources for accomplishing such tasks using combinatorial multimodal optimization for finding multiple optimal ways of dividing said set  $W$  of  $n$  tasks into  $m$  respective groups associated with said resources" and the amended preamble of claim 21 specifies substantially the same method. This makes it clear that there are to be as many groups as there are resources (in particular  $m$  of each) and that each group is associated with a particular resource (hence the modifier "respective"). This is a clear limitation on the meaning of the term "groups" which appears in these claims.

The claim term "groups" is further defined and hence limited at step (b) of amended claims 1 and 21 "calculating for each trial solution a fitness vector comprising  $m$  elements, each of which is indicative of whether the constraint condition of a corresponding respective one of the  $m$  groups has been satisfied by the trial solution." Use of the word "the" preceding the claim term "groups" makes clear that Applicant is referring back to the "groups" referred to in the preamble of the claims, as discussed above. Furthermore, it is clear that there are  $m$  groups where  $m$  is the number of resources and it follows that there is a corresponding group for every resource and there are  $m$  of each, i.e.,  $m$  resources and  $m$  groups with each group corresponding to a respective resource. Once an optimized solution has been found, each group of tasks will be assigned to its corresponding resource.

On the other hand, as noted above, while Corne discloses 11 links (and 7 nodes) how many objectives are there? There are 3 objective functions, but 3 does not equal 11 (nor 7). There is not a corresponding respective objective function associated with each resource – if there were there would have to be more than 3 objective functions since the number of resources is 11 (if you take the resources to equal the links, or 7 if you take the resources to be nodes as the Examiner has suggested). Since each "group" of the present claims has a corresponding respective resource and since each objective function of Corne does not have an associated resource it stands to reason that the objectives of Corne do not correspond to the claimed groups of Applicant's invention.

Furthermore, even if the objectives of Corne did correspond to the groups required in the present claims, the present claims further require that the fitness vector has  $m$  elements – however, in Corne the fitness vector has only 3 elements whereas  $m$  (which is equal to the number of resources) equals 11 (if the resources are links, or 7 if the resources are nodes) so Corne also does not satisfy the requirement in the present claims that the fitness vector has  $m$  elements.

In responding to the above arguments presented in Applicant's Appeal Brief of August 4, 2008, the Examiner states that the claims are not clear "that there are as many groups as there are resources" because the parameters  $W$ ,  $n$ , and  $m$  are italicized in some instance but not in others. See Office Action at page 15. However, as noted above claims 1 and 21 have been amended and the terms  $W$ ,  $n$ , and  $m$  are now

consistently depicted. Accordingly, claims 1 and 21 and their respective dependent claims patentably define over Corne for the reasons given above.

The above arguments have been specifically addressed to independent claims 1 and 21 which expressly recite the claim term "groups." However, the same arguments are applicable to amended independent claims 14 and 23-25 which require ". . . elements each of which is associated with a corresponding respective one of the [plurality of devices **or** multiple computer processor devices] and is indicative of whether the constraint associated with that corresponding [device **or** multiple computer processor device] has been satisfied by the trial solution . . . "This requires a one to one correspondence between elements of the vector and resources (i.e., a given element must be associated with a single resource and not with multiple different resources as in Corne) where the "resource" in question depends upon the particular claim (e.g., in claims 14 and 23 its "devices" in claims 24 and 25 its "processor devices"). Thus, Applicant's inventions clearly distinguished over Corne since in Corne each element is associated not with a single link, but with all of the links. Instead in Corne, each element is associated with a certain type of constraint which is applicable to all of the links and then the individual extents to which that type of constraint is satisfied for every link are summed together to generate an overall extent to which that type of constraint is satisfied by the system as a whole.

In summary, Corne does not teach or suggest ". . . elements each of which is associated with a corresponding respective one of the [plurality of devices **or** multiple computer processor devices] and is indicative of whether the constraint associated with

that corresponding [device or multiple computer processor device] has been satisfied by the trial solution . . . , " as required by amended independent claims 14 and 23-35.

Rather, each element in Corne is indicative of the global extent to which a particular global objective function has been met. Thus the same arguments apply for independent claims 14 and 23-25 as for independent claims 1 and 21.

In responding to the these arguments also presented in Applicant's Appeal Brief of August 4, 2008, the Examiner states that "[t]he language used in the claim does not require that there be as many elements in the fitness vector as there are resources." See Office Action at page 17. However, as noted above claims 14, and 23-25 have been amended to more clearly require this limitation. Accordingly, these claims and their respective dependent clams also patentably define over Corne for the reasons given above.

For all of the above reasons, it is respectfully submitted that Corne does not anticipate the present claims. Appellant's claimed solution provides a useful technique for approaching a certain type of problem which is not taught or even suggested in Corne. Accordingly, independent claims 1, 14, 21 and 23-25 and their respective dependents claims patentably define over Corne.

The Examiner has also rejected claim 7 under 35 U.S.C. § 103(a) as being unpatentable over Corne in view of Buczak et al. ("Buczak"). Applicant respectfully traverses the Examiner's § 103(a) rejection of claim 7.

The Examiner has cited Buczak merely for teaching that a non-reserved proportion of the new population is generated using a Roulette wheel selection method.



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Accordingly, it should be clear that Buczak does not overcome the deficiencies noted above with respect to Corne. Therefore, all of the present claims are believed to patentably define over the cited art taken singly or in combination.

Therefore, in view of the above amendments and remarks, it is respectfully requested that the application be reconsidered and that all of claims 1, 3-21 and 23-25, standing in the application, be allowed and that the case be passed to issue. If there are any other issues remaining which the Examiner believes could be resolved through either a supplemental response or an Examiner's amendment, the Examiner is respectfully requested to contact the undersigned at the local telephone exchange indicated below.

Respectfully submitted,

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